A remarkable new species of *Candalides* Hübner, 1819 (Lepidoptera, Lycaenidae) from the Bismarck Archipelago, Papua New Guinea

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Abstract: *Candalides **insanea*** **sp. n.,** a striking species from montane New Britain Island, Papua New Guinea, is described and figured. The holotype male and only known specimen is deposited in the Australian Museum, Sydney, Australia. The genus *Candalides* is recorded from the Bismarck Archipelago for the first time. Male adults and genitalia of *C. neurapacuna* Bethune-Baker, 1908, *C. pruina* Druce, 1904, and *C. biaka* (Tite, 1963) are illustrated for comparison.

Keywords: Lepidoptera, Lycaenidae, new taxon, *Candalides*, *insanea,* Bismarck Archipelago, Papua New Guinea.

Eine bemerkenswerte neue Art der Gattung *Candalides* Hübner, 1819 (Lepidoptera, Lycaenidae) vom Bismarckarchipel, Papua-Neuguinea

Zusammenfassung: Die bemerkenswerte neue Art *Candalides **insanea*** **sp. n.** von den Gebirgen der Insel Neubritannien, Papua-Neuguinea, wird beschrieben und abgebildet; der männliche Holotypus befindet sich im Australischen Museum, Sydney, Australien. Die Gattung *Candalides* wird erstmals vom Bismarckarchipel gemeldet. Männliche Falter und Genitalien von *C. neurapacuna* Bethune-Baker, 1908, *C. pruina* Druce, 1904 und *C. biaka* (Tite, 1963) werden zum Vergleich abgebildet.

Introduction

Together with the genus *Nesolycaena* Waterhouse & Turner, 1905, *Candalides* Hübner, 1819 constitutes the tribe Candalidini. *Candalides* contains about 30 species, while *Nesolycaena* has only four (Tite 1963, Edwards & Kerr 1978, Braby 1996, 2000, Braby & Douglas 2004, Braby 2008). The latter genus is an Australian endemic and Candalidini are wholly restricted to the Australian region. Outside of Australia the genus is known essentially from mainland New Guinea and its satellite islands, with one species also ranging to the Lesser Sunda Islands and Timor. Tite (1963) recognised three genera within what is currently referred to as *Candalides,* and using this structure, Braby (2000) and Braby & Douglas (2004) placed these as species groups within *Candalides,* namely the *C. absimilis* (C. Felder, 1862), *C. erinus* (Fabricius, 1775) and *C. xanthospilos* (Hübner, 1817) groups. The *C. absimilis* group is the largest, comprising 21 described species (Parsons 1998, Tennent 2006, Braby 2008). Most of these taxa are confined to tropical forests in New Guinea and surrounding islands, with just six species recognised from mainland Australia (Edwards 1996, Braby 2000, Edwards et al. 2001).

In this paper, a new species in the *C. absimilis* group is introduced that is completely unique from the usual lustrous blue ♂♂ of the *C. absimilis* group. It is the only species in the genus known to occur in the Bismarck Archipelago.

Nomenclature follows that of Parsons (1998) and Tennent (2006). The description follows the venation according to the numerical notation.

Abbreviations

AM Australian Museum, Sydney, Australia.

ANIC Australian National Insect Collection, Canberra, ACT, Australia.

*Candalides **insanea*** sp. n.

(Figs. 1, 2, 9)

Holotype ♂: Papua New Guinea, Whiteman Range, West New Britain Province, 1100 m, 6°0′ S, 150°35′ E, 28. x. 2012, Chris J. Müller, genitalia dissected and held in vial pinned to specimen (AM), Registration Number AM K310558. – No paratypes.

Etymology: The name '*insanea*' reflects the extreme morphology with respect to other members of the genus.

Diagnosis:

♂ (Figs. 1, 2): Forewing length 19.5 mm, antenna 11.5 mm (holotype). Head dark brown-black, clothed with dark brown-black hairs; labial palpus light white-grey, eye ringed narrowly with white-grey; antennae black, ringed weakly with grey ventrally. Thorax dark grey-brown with long grey-brown hairs above, beneath white-grey with white-grey hairs. Abdomen dark brown-black above, white-grey beneath, claspers dark brown-black.

Forewing with costa slightly bowed towards base, termen subtly serrated (indented at vein ends); upperside ground colour metallic lime green, frosty light green at some angles, black along veins except in median area between veins 1b and 7 where veins are lain with metallic green-yellow sex scales; costa broadly dark brown-black from approximately 2 mm from base to junction with vein 11, dark brown-black area extending narrowly into cell as diffuse dusting; termen broadly dark brown-black and extending in a straight yet slightly diffuse line from inner margin (5 mm from termen) to apex, dark brown-black area jutting in basally perpendicular to costa between veins 5 and 6, margin of wing in apical area between veins 6 and 9 narrowly (0.5 mm) medium grey, cilia between apex and vein 1b dark brown-black and white-grey at tornus and along inner margin; underside background colour white-grey, basal quarter suffused with light brown between cell and inner margin, termen narrowly dark brown-black, a row of diffuse dark brown-black terminal spots (approximately 1 mm in size) between veins, a second row of subterminal spots of similar size and colouring between veins 1b and 7 that are more clearly defined towards termen, a postmedian band of triangular dark brown-black spots (approximately 1 mm

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Figs. 1–8: *Candalides,* adult ♂♂. Odd numbers uppersides, even numbers undersides. **Figs. 1, 2:** *Candalides insanea* sp. n. **Figs. 3, 4:** *C. neurapacuna*. **Figs. 5, 6:** *C. pruina*. **Figs. 7, 8:** *C. biaka*. — Scale bar = 1 cm (i.e., ca. double life size).

in size but decreasing in size towards costa) between veins 1b and 9, this postmedian band is perdendicular to costa between veins 5 and 9 and between veins 1b and 3 but approximately parallel to termen between veins 3 and 5, the postmedian and subterminal bands converge to a diffuse inverted two-sided triangular marking between veins 1b and 2, a median dark brown-black bar approximately 0.5 mm wide in discocellular region at end of cell between veins 4 and 6, cilia light grey and dark grey at vein ends.

Hindwing rounded; upperside ground colour metallic lime green, frosty light green at some angles, narrowly dark brown along veins and discocellars, termen broadly (4 mm) dark brown between veins 1b and 7 where contact with the ground colour is very diffuse, particularly between veins 1b and 4 where sporadic green scales reach near to the termen, between costa and vein 7 and between costa and cell broadly medium brown, darkening towards termen, between inner margin and vein 1b medium brown grading to light grey at base, cilia dark brown-black close to termen and light grey distal from base except in tornal area between veins 1a and 3 where cilia are entirely dark brown-black; underside background colour white-grey, basally with small area of metallic pale yellow-green scales, termen narrowly dark brown-black, a row of well defined dark brown-black terminal spots (approximately 0.7 mm in size) between veins from vein 1b to 7, a second row of

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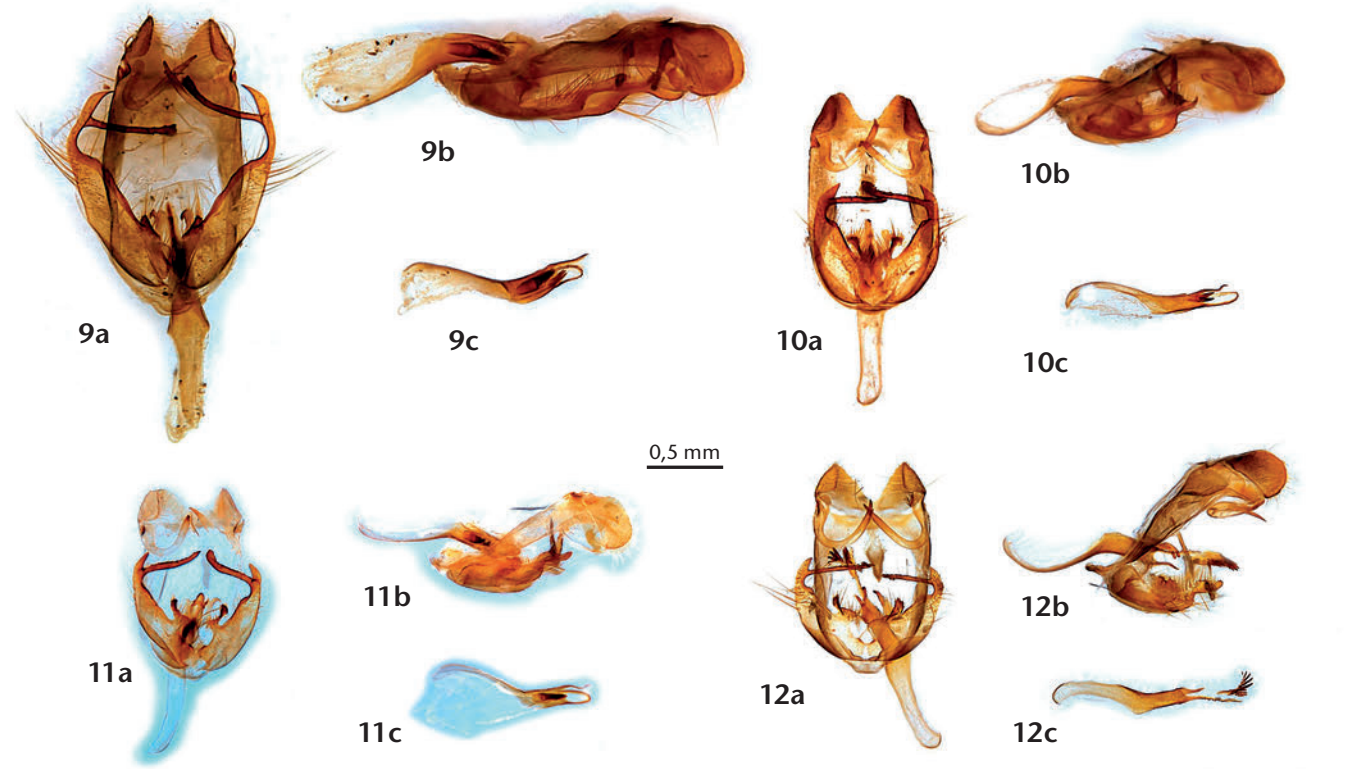

Figs. 9–12: *Candalides* male genitalia, **a:** genitalia ventral view, **b:** genitalia lateral view, **c:** phallus lateral view. **Fig. 9:** *Candalides insanea* sp. n. **Fig. 10:** *C. neurapacuna*. **Fig.11:** *C. pruina*. **Fig. 12:** *C. biaka*. — Scale bars = 0.5 mm; all genitalia at approximately the same scale. — **Fig. 13:** Whiteman Range, viewed in western direction; the type locality of *Candalides insanea* sp. n.

triangular subterminal spots (up to 1.5 mm in size) of similar colouring between veins 2 and 8, between veins 1b and 2 the spots in this subterminal row decreases and three spots occupy this space, a postmedian band of dark brown-black spots approximately 1 mm in size that are triangular between veins 2 and 6 and elongated perpendicular to the costa between veins 6 and 8, the spots in this postmedian row decreases in size between veins 1b and 2 and two spots occupy this space, a sub-basal row of four irregular dark brown-black spots approximately 0.7 mm in size, each between veins 1a and 1b, 1b and 2, 7 and 8 near the junction with the cell and also within the cell two-thirds from the base, a basal row of four well defined circular black spots approximately 0.5 mm in size, each between veins 1a and 1b, 1b and cell, within cell one-quarter from base and between the cell and vein 8, a median dark brown-black bar approximately 0.3 mm wide in discocellular region at end of cell between veins 4 and 6, cilia light grey and dark grey at vein ends.

Male genitalia (Fig. 9). Vinculum and tegument ring oval, deeply recessed posteriorly into sociuncus, saccus long, tapered anteriorly, socii with lateral margin rounded, socii separated by U-shaped sinus, brachium tapered dorsally; valva long and boat-shaped, indented in mid-section and tapering to a sharp point apically, valva with long long club-shaped appendage, juxta bifurcated; phallus with prezonal section approximately equal to postzonal section, slender, with bifurcated sclerotized cornutus.

Distribution: New Britain Island.

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Discussion

C. insanea sp. n. is unlike any known *Candalides* and is thus difficult to compare to other species. The upperside metallic green ground colour of the new species is reminiscent of that of the green Sundaic *Arhopala* Boisduval, 1832 ♂♂, e.g., *A. trogon* (Distant, 1884) and is unknown within butterflies of the Australian Region, including New Guinea. Certainly within *Candalides*, the ♂♂ of all other known species are shades of blue, purple or white. The metallic green of male *Ornithoptera* Boisduval, 1832 is rather similar but is grass green, as opposed to the lime green present in *C. insanea*.

C. insanea is one of the largest *Candalides* species, the ♂ forewing length comparable to that of *C. afretta* Parsons, 1986, *C. grandisissima* Bethune-Baker, 1908 and *C. cupreus* (Röber, 1886), and is the most boldly marked beneath, with a more contrasting pattern than in other species. Four other species, *C. lamia* (Grose-Smith, 1897), *C. biaka, C. neurapacuna* and *C. grandisissima,* have well-defined markings on the underside but the pattern of the spots and striae are very different from the new species. *C. pruina,* similarly to *C. insanea*, bears a broad forewing upperside border that is oblique to the termen.

The ♂ genitalia of the new species is equally distinctive, being large and elongate, with acute socii and long, blade-like valvae. Similarly to *C. neurapacuna, C. pruina* and *C. biaka,* the valvae of *C. insanea* bear long appendages that stem from the subapical section and these are most pronounced in the new species. Such appendages are not present in other members of the *C. absimilis* group examined (viz. *C. absimilis*, *C. margarita* (Semper, 1879) and *C. afretta*).

Owing to its distinctiveness and inferred isolation within *Candalides,* it is difficult to interpret the relationship of the new species with other members of the genus without a molecular phylogenetic analysis. A relationship to *C. biaka,* endemic to Biak, would be plausible given that a Bismarck–Biak connection has been recognised in other groups of butterflies (Talbot 1928–1937, Ackery & Vane-Wright 1984, Müller et al. 2013).

The unique holotype of *C. insanea* was collected on a mountain saddle at 1100 m, after it descended from the canopy and alighted on a sapling about 3 m from the ground. Despite extensive searching in the vicinity over a period of some months following the initial discovery, no additional specimens were seen. The type locality is situated at the eastern end of the Whiteman Range (Fig. 13), proximal to Gasmata Village, which routinely records among the highest precipitation in the Australian Region. Rain and thick cloud may persist for weeks at a time in this area, severely hampering opportunities to survey. In New Guinea, several *Candalides* are montane specific and it is considered likely that *C. insanea* is restricted to upland areas.

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